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Development of guidelines that support organisations in managing their knowledge assets by means of IT

Bachelor Thesis

submitted in fullfillment of the requirements for the degree of
Bachelor of Science in Business Information Systems

by

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Abstract

Companies try to utilise Knowledge Management (KM) to gain more efficiency and effectiveness in business. The major problem is that most of these KM projects are not or rarely based on sustainable analyses or established theories about KM. Often there is a big gap between the expectations and the real outcome of such KM initiatives. So the research question to be answered is: What challenges arise in KM projects, which KM requirements can be derived from them and which recommendations support the goal of meeting the requirements for KM? As theoretical foundation a set of KM frameworks is examined. Subsequently KM challenges from literature are analysed and best practices from case studies are used to provide recommendations for action on this challenges. The main outcome of this thesis is a best practice guideline,which allows Chief Knowledge Officers (CKOs) and KM project managers to examine the challenges mentioned in this thesis closely, and to find a suitable method to master these challenge in an optimal way. This guideline shows that KM can be positively and negatively influenced in a variety of ways. Mastering Knowledge Management (KM) in a company is a big and far-reaching venture and that technology respectively Information Technology (IT) is only a part of the big picture.

Christoph Schmitz

Zusammenfassung

Unternehmen versuchen, Knowledge Management (KM) zu nutzen, um mehr Effizienz und Effektivität im Unternehmen zu erreichen. Das Hauptproblem besteht darin, dass die meisten dieser KM Projekte nicht oder nur selten auf nachhaltigen Analysen oder etablierten Theorien über KM basieren. Oft besteht eine große Kluft zwischen den Erwartungen und dem tatsächlichen Ergebnis solcher KM Initiativen. Die zu beantwortende Forschungsfrage lautet also: Welche Herausforderungen ergeben sich in KM Projekten, welche KM Anforderungen können daraus abgeleitet werden und welche Empfehlungen unterstützen das Ziel, die Anforderungen an KM zu erfüllen? Als theoretische Grundlage wird eine Reihe von KM Frameworks untersucht. Anschließend werden KM Herausforderungen aus der Literatur analysiert und mit Best-Practice-Beispielen aus Case-Studies werden Handlungsempfehlungen für diese Herausforderungen gegeben. Das Hauptergebnis dieser Arbeit ist eine Best Practice-Guideline, die es Chief Knowledge Officers (CKOs) und KM Projektmanagern ermöglicht, die in dieser Arbeit genannten Herausforderungen genau zu untersuchen und eine geeignete Methode zu finden, diese Herausforderung optimal zu meistern. Diese Guideline zeigt, dass KM auf vielfältige Weise positiv und negativ beeinflusst werden kann. Knowledge Management (KM) in einem Unternehmen zu meistern ein großes und weitreichendes Unterfangen ist und das Technologie bzw. Information Technology (IT) nur ein Teil des großen Ganzen ist.

Contents

List of Illustrations

Figures

Tables

Glossary

Continuum

a continuous sequence in which adjacent elements are not perceptibly different from each other, but the extremes are quite distinct

Delphi Method

In the Delphi method, a panel of experts in some subject area is selected. Each receives a statement of a problem in the subject area and a questionnaire with which his or her independent views regarding the problem are elicited. The panelists' responses are organised and analysed by a moderator to produce a summary of their views. This summary, along with a questionnaire, is sent to each panelist. After reviewing and considering the summary responses, the panelists again independently respond to the questionnaire. When one panelist''s view is very different from those of others, he or she is asked to provide an explanation that the moderator sends to all the participants. This process is repeated until a consensus on the problem is reached. If no consensus emerges within some prescribed time limit, then the moderator pools questionnaire responses and the most preferred alternative becomes the solution. (Holsapple and Joshi 2001)

SECI Model

The process of knowledge creation through **s**ocialization, **e**xternalisation, **c**ombination and **i**nternalization (Nonaka et al. 2001a)

Acronyms

CKO

Chief Knowledge Officer

GEPSE

governmental, economic, political, social, and educational

IT

Information Technology

KM

Knowledge Management

KME

Knowledge Management Episode

KMS

Knowledge Management System

1   Introduction

In the following chapter the topic of this thesis is introduced. In the first section the problem and the potential solution for this problem will be discussed. Section 1.2 deals with the research objectives and questions. Finally in section 1.3 the research method will be described.

1.1   Motivation/Problem Statement

Already in the 80ties, the term Knowledge Management (KM) was founded by Wiig on a Conference in Swiss in 1986 (Nazim and Mukherjee 2016). Knowledge Management (KM) is a long-standing discipline not just since age but with the proliferation of computers in companies and ever-increasing knowledge workers, Knowledge Management (KM) has become even more important. Over time KM has evolved in terms of maturity and adoption. In 2005, the term "Knowledge-based Systems" was already on the "plateau of productivity" on the Gartner "HypeCurve" (O'Leary 2008).

But in daily business there are many problems that are caused by no or bad Knowledge Management (KM). Knowledge is often not explicit and in many cases captured in the minds of experts. Employees leaving their company might take their knowledge with them and the company loses all this knowledge (Jennex 2008). Another challenge for companies is knowledge hoarding. To have an advantage over their colleagues employees do not share their knowledge (Kim et al. 2007). Knowledge (intellectual capital) of individual employees that is not available to the entire company can not be further processed by other employees and thus not contribute to the company's success (Wong 2005). In addition with growing data pools and rising quantity of data pools it gets even harder to find the knowledge needed (Jennex 2008).

With KM companies are put in position to know where knowledge resides and which knowledge needs to be shared with whom, how, and why (Gupta et al. 2000). This is becoming more important due to growing international competition which coerce organisations to gain more efficiency and especially more effectiveness in business (Wiig 2000). The KM theory suggests that knowledge is the organisational enabler for sustainable competitive advantage by strengthening efficiency and effectiveness in this hyper-competitive world (Alavi and Leidner 1999).

Knowledge Management Systems are a powerfull tool to increase the efficiency of a company, but many companies fail on trying to take advantage of Knowledge Management (KM). The major problem is that most of these projects are not or rarely based on sustainable analyses or established theories about KM (Wiig 1997). This leads to a big gap between the expectations and the real outcome of such KM initiatives (Alstete 2012).

To reach far better results and to lower the gap between KM expectations and reality, knowledge about KM theory is crucial to deal with the challenges which arise in KM projects. Since KM has been developed for many decades, the numbers of different approaches, methods and systems has increased and no codified, universally accepted framework has been established (Rubenstein-Montano et al. 2001) nor struc-

tured guideline or instructions exist (Sigmanek and Lantow 2016). Nevertheless, numerous approaches to KM frameworks exist in a wide range of depth and detail. But Rubenstein-Montano et al. (2001) state that most of them are restricted by lack of detail, lack of a guiding framework and/or fail to address the entire KM process.

In order to reduce the barrier to use KM in this thesis a guideline is developed to improve the implementation and continuation of KM projects.

To achieve this complex aim a structured approach is needed. For this reason, research objectives and research questions are formulated in the following section.

1.2   Research Aim and Objectives

The overall aim of this thesis is to develop a guideline that helps companies in effectively and efficiently managing their knowledge assets with knowledge management systems by analysing challenges and best practices (along KM frameworks). In order to solve the problem in a structured way, 4 research objectives (RO) were created. Each objective has been defined in more detail by research questions (RQ).

To have a structured approach and an overview of different areas/dimensions of Knowledge Management (KM), RO1 is formulated as follows:

- RO1: Identify and describe KM frameworks.

    - RQ1a: Which KM frameworks can be identified in literature?
    - RQ1b: Which steps/dimensions/categories are mentioned?

Building on RO1, an appropriate framework is to be selected that respects as many of the found dimensions as possible, but at the same time does not become too complex so that it provides a good overview of KM as a single framework. For this purpose, the second objective was formulated with the following questions:

- RO2: Select a KM framework which covers most of the relevant factors and which is suitable for structuring the challenges / best practices.

    - RQ2: Which framework is suitable for structuring the challenges / best practice?

With the knowledge from RO1 and RO2, the author should now be able to find and categorise challenges and best practices in literature. This step is described in RO3 and its related research questions.

- RO3: Identify KM challenges companies have in effectively and efficiently using Knowledge Management System (KMS) and group them based on RO2.

    - RQ3a: Which KM challenges can be discovered in literature and how can these challenges be categorised along the chosen KM framework?

– RQ3b: What KM requirements can be derived from RO1-RO3 that companies need to con-
sider?

The last step of this thesis is to find best practices and formulate recommendations for each challenge if
possible.

• RO4: Based on RO3, develop a guideline with recommendations which addresses the challenges
companies may have in using KM and KMS.

– RQ4a: Which best practices may help to master the challenges identified in RO3?

– RQ4b: Which recommendations can be formulated for the individual challenges?

1.3   Research Method and Thesis Structure

The research method used is basically literature review to identify, analyse and synthesise the important
factors for this thesis. Figure 1.1 is an illustration of the five research steps done in this thesis.
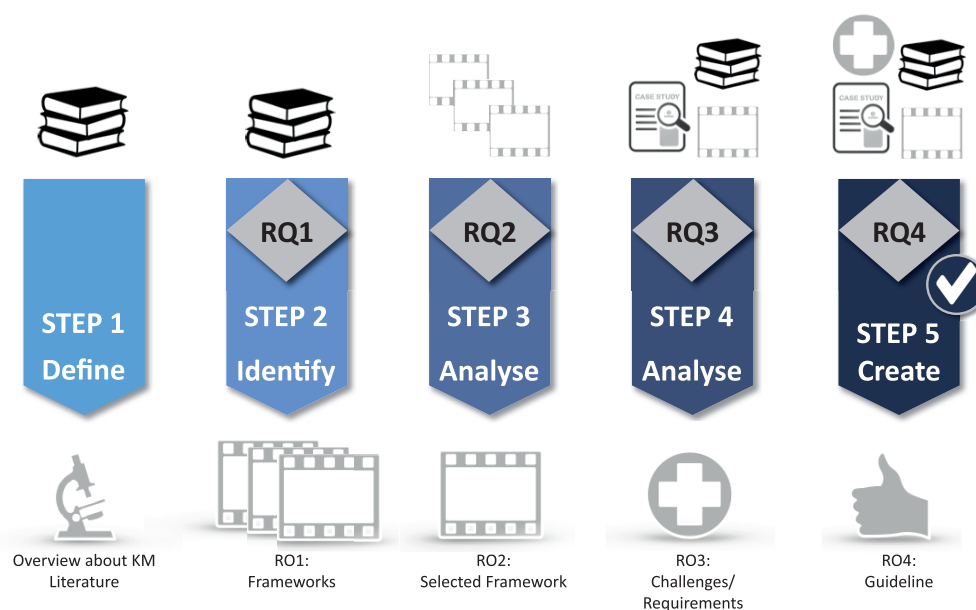
Figure 1.1: Research Steps (own illustration)

To understand the established but fragmented topic in the **first step** literature is searched via well known
databases (e.g. ACM Digital Library, SpringerLink, ScienceDirect Elsevier) with keywords such as "knowl-
edge management", "km best practices", "km case study" and snowballing is used to deepen the knowl-
edge within the found literature. The basis knowledge needed for this thesis is defined in chapter 2.
In the **second step**, the literature review is focused on identifying KM frameworks and the outcome RO1
is a brief description of frameworks to read in chapter 3.
The **third step**, the focus part is to analyse the frameworks and select a suitable framework for the next

steps. This is outcome of RO2 and can be found in section 3.2 of chapter 3.

In the **fourth step** the focus of the literature research is on the challenges and requirements from case studies which are named in connection with KM and framework selected in the previous step is used to group the identified factors. The results of this step can be read in chapter 4.

The **fifth step** is the final step of this thesis. Here literature research focuses on the best practices and recommendations from case studies in connection with KM. Also aligned with the outcome of RO2 the results are synthesised with the results from the fourth step to RO4 which is a "best practices guideline". The recommendations can be read in chapter 5 and the full guideline can be found in the appendix 6.2.

2   Definitions

At the begin of this thesis, the concepts of "knowledge", Knowledge Management (KM) and Knowledge Management System (KMS) are clarified and determined. The term KM is often used synonymously with Knowledge Management System (KMS). Actually, the process of acquiring, organising and communicating knowledge between human beings hides behind the term KM (Alavi and Leidner 1999). In order to understand the difficulties that KM brings, it is necessary to understand what is meant by knowledge (at least for this thesis) and how knowledge is exchanged between people. Therefore, in the following chapter, the focus will be on knowledge and its different dimensions.

2.1   Knowledge

In order to understand KM, the underlying concept of knowledge and its relationship to information and data must have been understood. Many authors have worked out the differences and similarities between these concepts (Firestone 2001; Fleming 1996; Wiig 1995; Griffiths 2012). Some mention only data, information and knowledge (Alavi and Leidner 2001) but most also mention "wisdom" as the fourth element in this typically as pyramid visualised concept (Fig. 2.1).
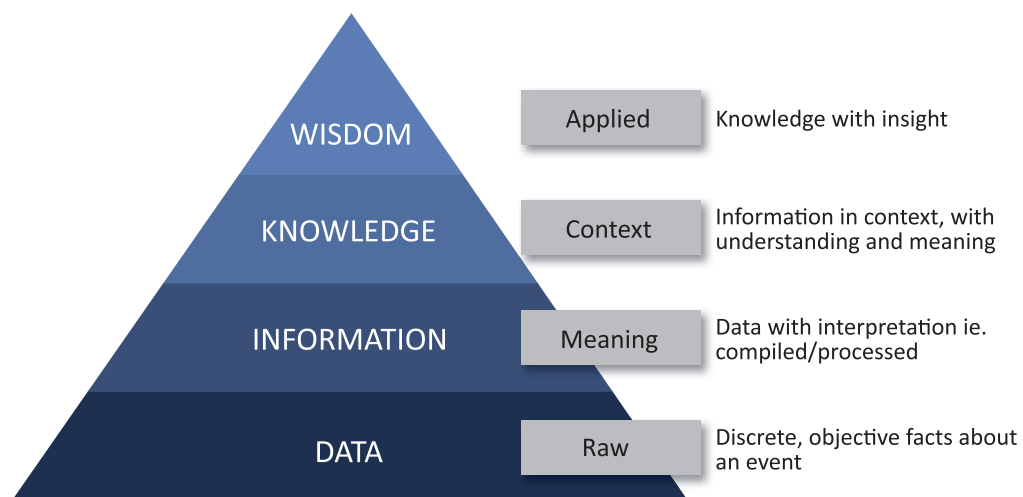
Figure 2.1: The Knowledge Pyramid. Adapted from (Firestone 2001)

These four can be viewed as part of a Continuum, one leading to another, each the result of actions on the preceding, with no clear boundaries between them (Nazim and Mukherjee 2016). Data represents information in its elementary rawest form (facts and figures). Data itself has no context and no meaning. When data is placed in a context it becomes information. Information represents fed data (data with context). Information that is structured and organized as the result of cognitive processing and validation becomes knowledge. Knowledge represents information with experience, insight and expertise

(information with meaning). Knowledge which enables someone to make decisions is wisdom. Wisdom represents the ability to use knowledge and experience to make good judgements (knowledge with insight) (Zins 2007; Nazim and Mukherjee 2016; Cooper 2016; Alavi and Leidner 2001; Alavi and Leidner 1999). So each entity (from data to wisdom) represents an increasing level of added value, complexity, abstractness, integration and context.

Davenport and Prusak (2000) thus summarizes knowledge aptly as the combination of information, personal experiences, insights, expertise, and logical reasoning in an actionable context.

Tacit knowledge vs. Explicit knowledge

Various knowledge classifications exist. Alavi and Leidner (2001) and Jennex and Croasdell (2007) found that the most commonly used classification is Polanyi's (1962, 1967) and Nonaka and Takeuchi's (1995) dimensions of tacit and explicit knowledge.

Nonaka and Takeuchi (1995) state that the western philosophy of knowledge, what they call explicit knowledge, is grounded in manuals and printed materials. Explicit knowledge is often described as "knowing about" or codifiable knowledge. In contrast, the Japanese form of knowledge, what they call tacit knowledge, is a knowledge that exists within the mind of the individual. Tacit knowledge is often described as "knowing how" (Griffiths 2012; Nonaka and Takeuchi 1995).

Explicit knowledge is revealed by its communication. This ease of communication is its fundamental property. Once knowledge is created it can be consumed by additional users at close to zero marginal cost (Grant 1996). Tacit knowledge is revealed through its application. Because tacit knowledge cannot be codified and can only be observed through its application and acquired through practice, its transfer between people is slow, costly, and uncertain (Kogut and Zander 1992).

Nonaka et al. (2001a) state that to empower members of an organisation to transfer knowledge to other members of an organisation three layers of knowledge has to interact with each other (Nonaka et al. 2001b). The three layers are (a) a platform or place which is not necessarily a physical space (e.g. virtual or mental space); (b) the process of knowledge creation (SECI Model model) and (c) knowledge assets or the inputs and outputs.

That people have to meet somehow, whether real or virtual is easy to understand. Also that knowledge sharing requires knowledge resources to be present. Part (b) the process of knowledge creation is a lot more complex. This part will therefore be described in more detail below.

The SECI Model Model

The SECI Model model (Fig. 2.2) which deals with the transformation from tacit and explicit knowledge and vice versa by Nonaka et al. (2001a) proposes four modes of knowledge transfer and creation:

- Socialization is the process of creating tacit knowledge by sharing experiences through joint activities. The quintessential example of socialization is a traditional apprenticeship. The Apprentices learn through observation and imitation of their masters.

- Externalization is the process of articulating tacit knowledge as explicit knowledge. Creating explicit concepts by using metaphors, analogies and models.

- Combination is the process of connecting discrete elements of explicit knowledge into one more complex and systematic explicit knowledge. Explicit knowledge is transferred through media such as documents, meetings, and e-mail and/or phone conversations. Categorization of this knowledge can lead to the generation of new knowledge.

- Internalization is the process of embodying explicit knowledge as tacit knowledge and is closely related to learning by doing. When knowledge is internalized in individuals tacit knowledge bases, it becomes a valuable asset.

(Nonaka et al. 2001a)
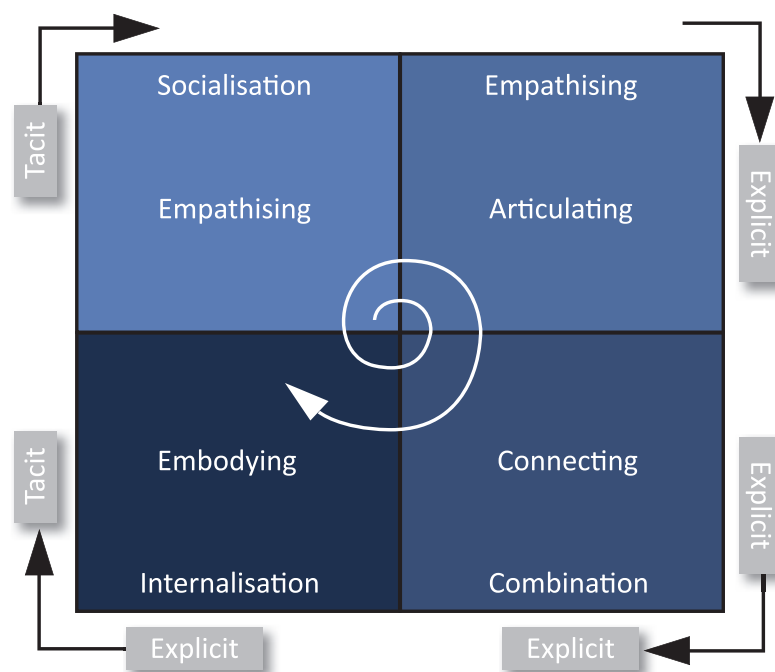
Figure 2.2: SECI Model. Adapted from (Nonaka et al. 2001a)

These four modes show that knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms (Davenport and Prusak 1998).

The concept of Nonaka et al. (2001a) is the theoretical cornerstone of this discipline and is being used to improve companies KM strategy (Dalmarco et al. 2017). At this point we have a definition of knowledge and know the difference between explicit and implicit knowledge. We also have an idea of how implicit knowledge can be processed into explicit knowledge and vice versa. What is still missing is the process that adds value for a company.

2.2   Knowledge Management

KM occurs when people transfer this knowledge mix of tacit and explicit knowledge to each other. In companies it is the process by which organisations identify, collect and codify existing explicit knowledge, and previously un-captured implicit knowledge and then propagate it, so that others may benefit (Cooper 2016; Wiig 1995). KM is "the coordination and exploitation of organizational knowledge resources, in order to create benefit and competitive advantage" (Drucker 2001). KM not only involves the production of information, but also the capture of data at the source, the transmission and analysis of this data, as well as the communication of information based on, or derived from, the data, to those who can act on it (Davenport and Prusak 2000).

In essence, Knowledge Management (KM) is the systematic process of creating, storing / retrieving, transferring, applying and sharing knowledge to increase and add value to the business. Of course, this process can be supported by Information Technology (IT) systems. To clarify the difference between KM and KMS, the term KMS is explained below.

2.3   Knowledge Management System

The major challenge of managing knowledge is less its creation and more its capture and integration (Grant 1996; Davenport 1997). Indeed, knowledge is of limited organisational value if it is not shared. The ability to retrieve and apply specialised knowledge of employees is crucial to a companies ability generate competitive advantage (Grant 1996). Conventionally, as shown above, knowledge creation and transfer is through direct interaction between employees. However, as companies are more and more driven by competition through globalisation, this traditional interaction may be too slow and less effective (Alavi and Leidner 1999). IT assists KM by providing systems for capturing and retrieving knowledge. This Systems called KMS provide repositories and methods to work with knowledge that is primarily in the explicit dimension. Capturing tacit knowledge is not easy to support with IT systems (Jennex 2008). Because technique and systems which support KM is not the focus of this thesis and because, as you will see later, technology is only a part of Knowledge Management (KM), KMS will not be covered here in more detail.

3   Theories and Frameworks

A broad theoretical basis for understanding and structuring the challenges and best practices which arise in KM projects is needed. So in this chapter KM frameworks will be analysed and compared to find one suitable for structuring the KM challenges. KM frameworks try to clarify which factors are to be considered in addition to the actual KM process. Frameworks try to present the most important factors and their connections in an abstracted presentation. A framework can integrate various elements and show relationships in between (Meise 2001). Choosing the right KM framework is very important for a good implementation of KM in companies because the framework provides a basic overview of the parts to be considered when doing KM. In order to create an understanding for the reader, various frameworks are presented. Subsequently, differences and resulting problems are considered. Finally, a framework is presented which, in the opinion of the author, combines the advantages of the previous frameworks and is, therefore, best suited for the understanding and structuring of the following work.

Brown and Duguid (1991) note that knowledge will not necessarily circulate freely firm-wide just because the technology to support such circulation is available. Explicit efforts at managing knowledge in organisations can benefit from an understanding of the factors, that influence the success of knowledge management initiatives (Holsapple and Joshi 2000).

The first decision concerns the approach whether it is a broad theoretical overview or it is a detailed practical implementation guide. Holsapple and Joshi (1999) call this two different approaches descriptive and prescriptive frameworks. Descriptive Frameworks try to identify the nature of KM phenomena and prescriptive frameworks prescribe methodologies. The focus of this thesis is to guide through organisational and conceptional hurdles rather than being a step-by-step guide on how to handle the KM process in a dedicated company so we look deeper into descriptive frameworks. If there is interest in this more practical approach by prescriptive frameworks then the Journal Article from Liebowitz et al. (2001) is a good starting point to get an overview of different methodologies for successful implementations of KMS. They analysed many existing ones and developed an own detailed methodology for implementing knowledge-management step-by-step.

Holsapple and Joshi (1999) also differentiate the descriptive frameworks in broad and specific frameworks. As the naming of this classifications gives an idea the broad frameworks attempt to describe the KM phenomena at whole and the specific frameworks focus on a single detailed part of this phenomena. For example the in 2.2 used framework of tacit and explicit knowledge by Nonaka et al. (2001a) is a framework which focuses on a special part of KM. This Thesis is looking for a broad framework to cover the full scope of KM.

3.1   Knowledge Management Frameworks

This section shows the differences between a variation of different frameworks. Each framework is developed by another author with different mindsets and/or different focus and accordingly considers different aspects as important. Subsequently a comparison is made the most suitable is selected as basis for the next chapters.

Framework: Knowledge Management Pillars

Wiig (1995) sets the focus on the functions of KM which he calls "The three Pillars of KM". The basis of the three pillars shown in figure 3.1 is a broad understanding of knowledge creation, manifestations, use, and transfer. Each pillar standing on this "KM foundation" represents different functions with several components. The first pillar is about exploring knowledge and knowledge acceptance. The components are survey and categorize knowledge; analyse knowledge and knowledge-related activities; elicit, codify, and organize knowledge. Pillar II consists of "appraise and evaluate value of knowledge" and "knowledge related actions" and can be summarised as an assessment of knowledge. The focus of the third one is administration and usage of knowledge and consists of "synthesize knowledge related activities"; "handle, use, control knowledge" and "leverage, distribute, and automate knowledge". Wiig (1995) targets organisational issues which affect the usage of KM in an organisations and identifies knowledge manipulation activities.

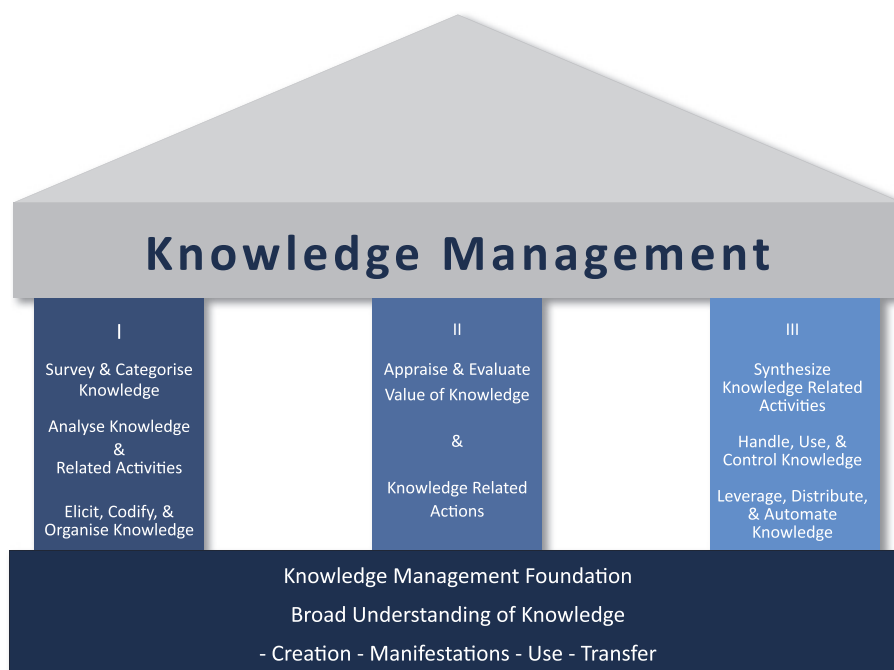
Figure 3.1: Pillars of Knowledge Management. Adapted from (Wiig 1995)

Framework: Core Capabilities and Knowledge Building Activities

The KM framework developed by Leonard-Barton (1995) consists of four core capabilities and four knowl-

edge building activities. In her opinion, these are the crucial parts of a knowledge based organisation. As shown in figure 3.2 the four core capabilities are surrounded by the knowledge building activities: importing knowledge, problem-solving, implementing and integrating, experimenting. These four activities build a cycle from getting knowledge from outside the company to solving problems to produce current products over implementing new methodologies and tools to enhance internal operations and experimenting to build potential for the future.
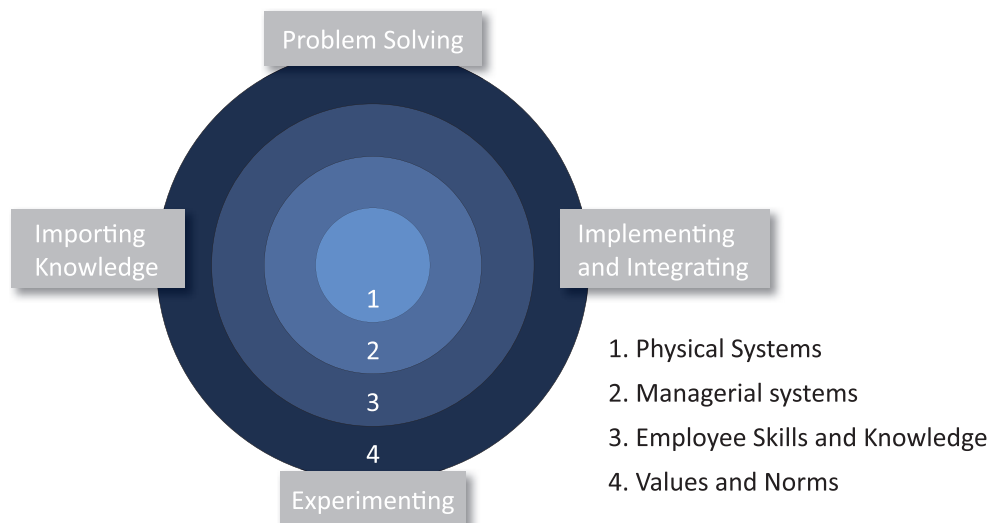
Figure 3.2: Core Capabilities and Knowledge Building Activities. Adapted from (Leonard-Barton 1995)

This cycle is influenced by the so-called core capabilities. She identified "physical systems" such as machines, software and databases, "managerial systems" which means organised routines for resource accumulation and channels to access knowledge, "employee skills and knowledge" and "values and norms" which could be translated into "what are tolerated and encouraged knowledge building activities". These four capabilities are not built-in in every company. "Core capabilities constitute a competitive advantage for a firm; they have been built up over time and cannot be easily imitated" (Leonard-Barton 1995). This framework takes care of manipulation activities like the framework from Wiig (1995) discussed above but focuses on the core capabilities a company must develop to have a competitive advantage against other companies.

Framework: Organisational Knowledge Management Model

Andersen and The American Productivity and Quality Center (1996) created a model (figure 3.3) which includes 7 processes which can operate on an organisations knowledge. These processes are create, identify, collect, adapt, organize, apply, and share. The model identifies four "enablers" of KM which are "culture", "technology", "measurement" and "leadership". The intent of this framework is to provide the tools to benchmark the handling of KM between different companies. As such, it identifies knowledge activities and their enablers but lacks in detail. Neither includes this model detailed information about

the type of information which is processed nor does it characterise the processes themselves. The model does also not detail the nature of the enablers.
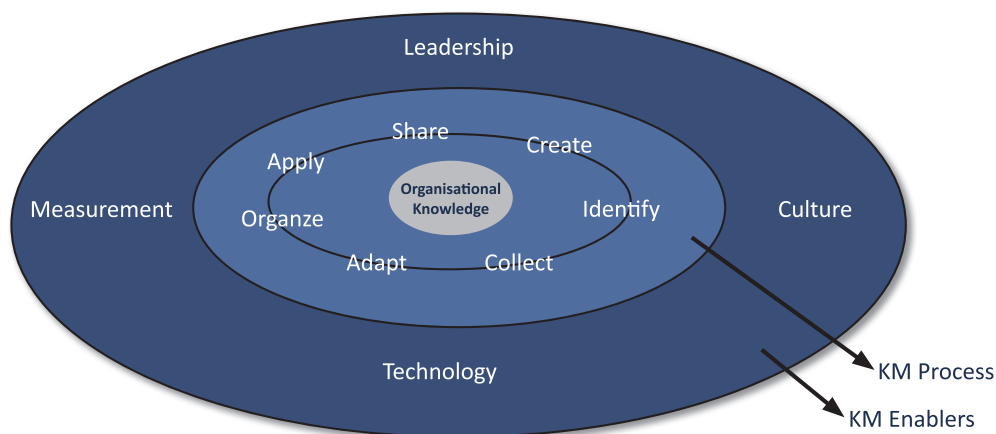
Figure 3.3: Organisational Knowledge Management Model. Adapted from (Andersen and The American Productivity and Quality Center 1996)

Framework: Influences on the Management of Knowledge

After examining 10 descriptive frameworks Holsapple and Joshi (1999) came to the conclusion that there is no standardised notation nor a consistent opinion about the contents of the influence dimension. He concluded that only with a unified model it would be possible to promote a common understanding of KM with its various influences and the interaction between these. Starting with a initial framework, synthesised from the literature Holsapple and Joshi (1999), Holsapple and Joshi (2000) used the Delphi Method to develop a new framework.

The framework (Figure 3.4) represents a triangle with an inner two-part circle. The outer part of the circle called "Knowledge Management Episode (KME)" stands for the process in organisations from the trigger of a knowledge need to its satisfaction which leads to an achievement of "Learning and Projection" which is displayed in the inner circle. The triangle with its corners describe the different forces that cooperate to influence the KME which take place in a company. The three major forces are: Managerial Influences, Environmental Influences and Resource Influences. The figure 3.4 shows also the main factors involved for each influencing force.

The objective of this framework is it to describe or even to name all possible influences to KM projects regardless they focus on the managerial influences like "Leadership", "Control", "Coordination" and "Measurement" as they are most likely to be controlled of persons responsible for KM initiatives. However, the presentation is missing how the influences influence each other.
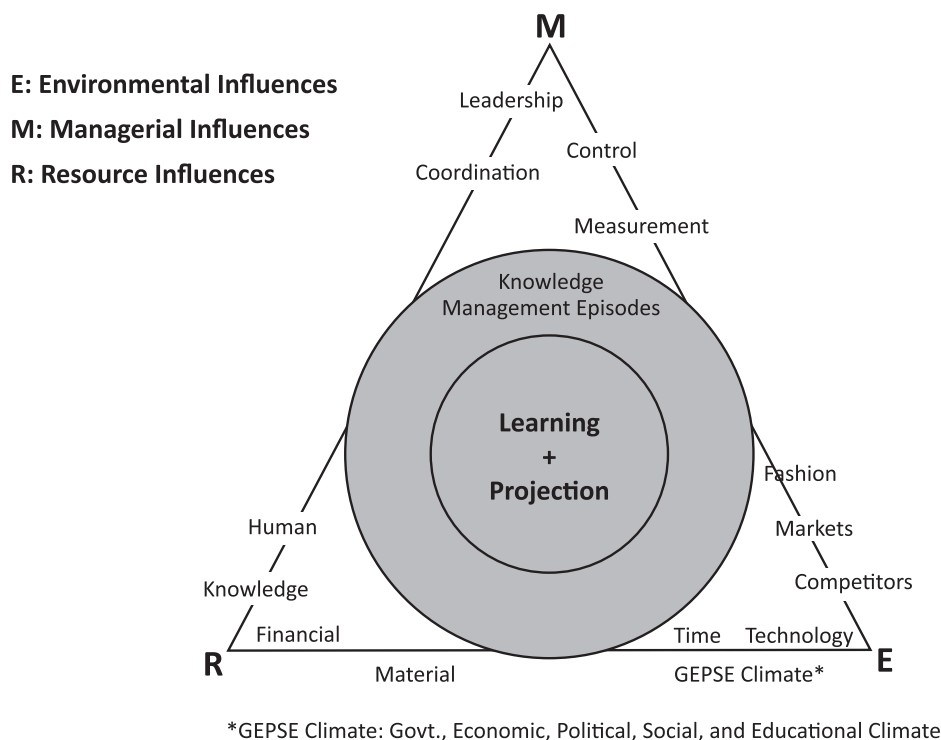
Figure 3.4: Influences on the Management of Knowledge. Adapted from (Holsapple and Joshi 2000)

3.2   Framework Comparison and Selection

These four examples show problems that most other frameworks also have in common. Depending on the viewing angle and the viewer experience and mindset, other factors may be considered important or less important although most of the frameworks try to solve the same problem. In order to clarify the train of thought, short comparisons will be made between the examples in two dimensions.

Dimension: Knowledge Manipulation Activities

For example, Wiig (1995) talks about the "KM foundation" and identifies four different Knowledge manipulation activities whereas Andersen and The American Productivity and Quality Center (1996) identifies "processes" which also expresses the same or similar meaning but split into seven tasks. The four "building activities" by Leonard-Barton (1995) also identify some KM manipulation activities but the one by Wiig (1995) and Andersen and The American Productivity and Quality Center (1996) appear to be more elemental or more universal.

Dimension: Influences on the Conduct of Knowledge Management

All of the example frameworks recognise the influence dimension of KM. The Table 6.1 summarizes what influences on the conduct of knowledge management are identified.

Only Leonard-Barton (1995) discusses and illustrates the influences she identifies in her framework. Moreover, Andersen and The American Productivity and Quality Center (1996) considers the found influ-

ences only as KM enablers and not as possible obstacles as Leonard-Barton (1995) does. The framework of Holsapple and Joshi (2000) on the other hand only considers the influences on KM

When comparing many frameworks of different authors, there is a wide variety of perspectives with different approaches. Each one contributes to understanding the KM phenomenon but none looks holistically at KM.

Framework: Context-based framework of knowledge management

The framework (Figure 3.5) of Okunoye and Bertaux (2008) combines the lessons learned from the other frameworks to a new "context-based framework of Knowledge Management". This framework not only tries to view KM holistically but also differs from those presented earlier in that it considers the relationships between and interdependency of all components which was the focus of the influences framework described above (Section 3.1).

In a context-aware KM framework, KM is seen as an effort to properly put all the organisational variables into best use, with the support of relevant information technology, in order to ease the knowledge processes. The main overall goals centre on organisational productivity, responsiveness, innovation, and competency through the creation and protection of knowledge resources.

The framework includes the generally accepted basic components: "knowledge resources", "KM processes" and "influences". The KM process influencing components are "information technology", "environmental factors" and "organisation variables". The focus is on organisation variables as recommended by many different sources such as (Holsapple and Joshi 2001) and (O'Leary 2016).
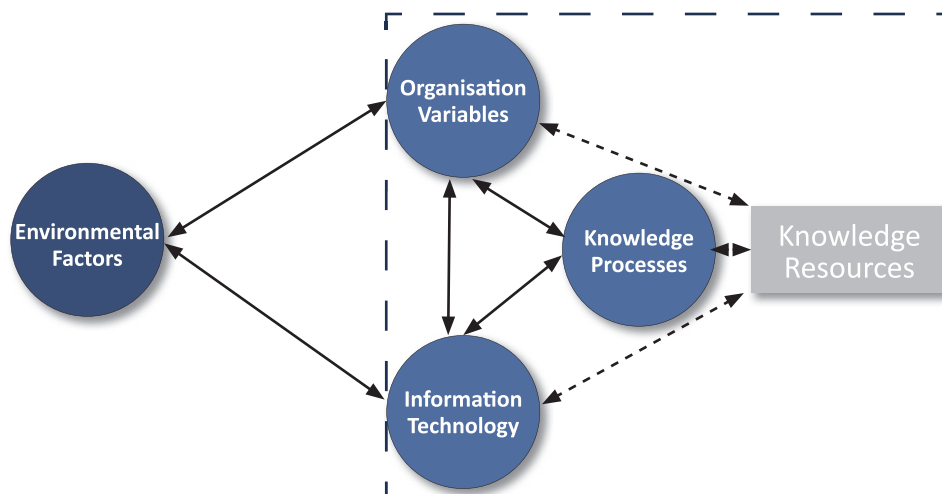
Figure 3.5: Context-based framework of KM. Adapted from (Okunoye and Bertaux 2008)

The "knowledge processes" are all activities that support individual and collective knowledge and interaction (Alavi and Leidner 2001). As already known also here these activities are knowledge creation, knowledge storage/retrieval, knowledge transfer and knowledge application.

The main target of knowledge processes are the "knowledge resources". Okunoye and Bertaux (2008)

here also accepts those mentioned by Holsapple and Joshi (2001). Employee knowledge, knowledge embedded in physical systems, human capital, organisational capital and customer capital. "Information technology" provide support for KM by supporting the core "knowledge processes" and can enhance the interaction between individuals, groups and organisations.

"Organisational variables" describes all the organisational enablers that can influence KM. The organisational enablers are "Task", "Structure", "Information and decision processes", "reward systems" and "people" which Okunoye and Bertaux adopted from Galbraith (as cited in Okunoye and Bertaux 2008) and added "culture" as another important component. Markus & Robey state (as cited in Okunoye and Bertaux 2008) that organisational change depends how well the interrelationship of these enablers can support the organisations core activities considering the information technology and the influence of environmental factors.

"Environmental factors" include all factors outside the organisation that directly influence its activities. In addition to the governmental, economic, political, social, and educational (GEPSE) factors, it also include indirect influence factors such as culture and national infrastructure.

Summary

In this chapter different frameworks were presented. Each had a different focus and, accordingly, other factors were considered important. The selected framework attempts to overcome this disadvantage by combining the previous frameworks. The selected framework as a basis, provides an overview of the five dimensions that should be considered in the KM environment. In addition to the main components the influencing factors are shown. The focus here is on the organisational variables. In the next chapter we will discuss which challenges and thus also demands on KM arise in companies .

4   Aspects of Knowledge Management

In this chapter, the focus is on describing the different aspects aligned by the above framework illustrated dimensions and sub-elements (Section 3.2). The aim is to give an overview of the different aspects which should be addressed by a KM project. This overview describes a selection of the found aspects during the research for this thesis. Based on the dimensions of the chosen framework in chapter 3, the essential elements for a successful implementation of km projects in companies were worked out. These components will be described in more detail below.

Organisation Variables

"Organisational Variables" describe all organisational issues that can influence KM. Culture is one of the most mentioned aspects in the literature that should be considered. Often in this context, the terms "sharing culture" and "collaborative culture" are mentioned. This is essentially about how the company deals with the distribution of knowledge within the company and whether it is rather promoted or prevented. Here, factors such as the transfer of knowledge between the company and the employee play just as much a role as the communication of knowledge between employees. Is it allowed to make mistakes or are you embarrassing yourself with false statements. Are there open discussions in decision-making processes or should one only say something if it is definitely right. The same applies to the area of management. Is the management behind the idea of the KM or are the principles of the "sharing culture" no longer important if that means that money has to be spent in the first step.

Information and decision processes include the decisions about which information is worth sharing and what information is too much or unnecessary. For this, it is necessary that the people in the company have an understanding of KM and see the relevance of KM for the company. It also depends on whether and to what extent personnel training is needed and received. This concerns the theoretical form as well as the technical one.

Employees behave very differently in the company depending on whether and to what extent a company sets incentives to follow the given direction. It makes a difference whether employees are individually rewarded for action or whether an entire team receives benefits for performance. In addition, there is always the question in the room if and how a project manager will be rewarded for the success of the team.

The company structure also offers great opportunities and risks for KM. Growing hierarchies and bureaucratic structures are well-known in companies for even outcomes, but these structures can also slow down KMs performance. The structure also includes whether there are special positions in the company for KM employees. This is not just about employees at the bottom of the structure but also about leadership positions.

This also plays a role in the tasks. Among other things, the areas of culture, structure and people come together here. Here are several factors to consider. How much effort is invested in the planning in ad-

vance. Who or which departments are involved in the planning. KM is part of the IT strategy or part of the strategy of the development department or is it even a part of the corporate strategy.

Knowledge Resources

"Knowledge Resources" concerns the capital of the company. This also includes capital in the form of money if one speaks of the devices in whose development money has flowed. The term "knowledge resources" mainly refers to the knowledge within the organisation and above all the knowledge and skills of the employees themselves. This area is mainly about the proper management and development of these resources. Here are relevant points, among other things, how well a company can name the places in which various knowledge exists and how the knowledge flows through these areas. In addition, knowledge is linked in many ways to the human resource. And this resource is not infinite and must be considered accordingly when planning projects.

Knowledge Processes

"Knowledge Processes" are creation, storage / retrieval, transfer and application. In this area, the focus is on the management of these processes. Are the processes only represented with the help of technology or are there processes in the company that support the regular exchange of employees face-to-face. Is the "knowledge process" just added to the company or integrated into the daily work flow of each employee.

Information Technology

"Information Technology" can support the processes of KM. It can also enhance the interaction of individual, group and organisational knowledge by dissolving or reducing the barriers created by globalisation. Here are mainly the time difference and the spatial distance between employees to call. It also affects linguistic barriers. The functions and the quality of the technology used can make a big difference here. Therefore the KM Software selection process is an important component.

Environmental Factors

"Environmental Factors" include those factors that directly influence its activities. Holsapple and Joshi (2000) among many others include here typically governmental, economic, political, social, and educational (GEPSE) factors. This includes also the competition by other companies in the environment of the product as well as in the environment of the employee search. Globalisation enhances these effects and makes these tasks more complex than ever.

Summary

Even though Knowledge Management (KM) projects are very complex and every company needs different processes, with the knowledge gained from this chapter, it is possible to at least better recognise some problems and work on them with a better understanding. How to tackle these problems in detail or best how to avoid them is described in the next chapter.

5   Best practice Guideline

In the last chapter, the focus was on the challenges that have to be addressed in KM projects. These were collected in the "Best practice Guideline" (table 6.2) structured according to the dimensions of the selected KM framework. The aim in the following section is to provide recommendations (best practices) to handle these challenges summarised in chapter 4. These recommendations have also been included in the "Best practice Guideline" (table 6.2) suitable to the respective challenges.

5.1   Development and Construction of the Guideline

The table 5.1 shows an excerpt of two rows of the final outcome of this thesis. To get this large table onto a page in addition, the last two right columns are omitted. These columns contain quotes from the challenges and best practices found to underpin the recommendations and the literature sources. In order to create this guideline, the found challenges from literature were inserted into the "quotes" column in the first step. Afterwards the individual challenges were evaluated and assigned according to the five dimensions of Okunoye and Bertaux's 2008 framework discussed in chapter 3. Subsequently, the "best practices" found were examined and assigned to the individual challenges and added into the "quotes" column. With the knowledge about the challenge and the corresponding best practice the "problem" and the "recommendation" columns could be formulated. The idea behind this structure is that Managers or KM project leaders can use this table to examine critical aspects before a project and/or can find possible solutions to problems which arise during a KM project. To give an overview of the results which are listed in detail in the table 6.2 the next chapter discusses only the recommendations.

Table 5.1: Best practice Guideline (excerpt)

dimension	aspect	problem	recommendation
Organisation Variables	Culture	acceptance of KM process and KM systems	Develop or foster a sharing culture which values knowledge and encourages the whole knowledge process from creation to application. A sharing culture also increases the acceptance of KM systems. A sharing culture means also a collaborative culture. Collaboration enriches the knowledge transfer which promotes the sharing culture itself.
Information Technology	Product Selection	There is no software solution that meets all our requirements	In most cases, not one but a variety of IT tools is the best solution for KM projects. It is ok to have different applications for different purposes as chat or file storage as long they are all searchable ideally within one integrated company search

5.2   Best practices / Recommendations

The following section is structured according to the 5 dimensions used in Okunoye and Bertaux (2008)'s framework. To give a brief overview of the results of this thesis only the recommendations without problem description and without further information from literature are discussed.

Organisation Variables

It is important to carefully examine your own corporate culture. Key to managing organisational change and renewal is a "sharing culture". So developing such culture is an important part of the way to functional KM. A "sharing culture" is a culture which values knowledge and encourages the whole knowledge process from creation to the application. To ensure that the whole company follows the idea of sharing, the members of the executive floor should already live or at least build up a "sharing culture". A sharing culture means also a collaborative culture. Collaboration enriches the knowledge transfer which promotes the sharing culture itself. In order to foster cooperation, it is important to promote trust among the employees. It should be allowed to make mistakes and talk about mistakes. Making mistakes is a key source of learning. Building a relationship of trust between individuals and groups will help to facilitate a more proactive and open knowledge sharing process.

The process of learning is generally understood as the internalisation of information. This quickly leads to the assumption that one can learn more with more information. But caution too much information can make learning difficult. It should always be taken care not to share too much information despite the "sharing culture".

Employees need to be trained to understand KM requirements and employees must be well informed that KM is a key to the company's success. To achieve this the leadership should be encouraged to share and offer information as a role model. Furthermore, the own definition of "sharing culture" should be defined according to the company. To get and bind the right employees a well-trained human resources (HR) department is needed.

A good way to motivate individuals to practice KM and make use of KMS are reward systems. Reward systems spread over different aspects such as financial bonuses as well as regular evaluations. But beware reward systems can also lead to so-called "Knowledge-hoarding". "Knowledge-hoarding" means that individuals do not share their knowledge with their colleagues any more. This happens when good individual results are over-rewarded. Incentives should put the focus on group performance. In addition, it should be possible that they can be influenced by individual employee performance but only reachable with the whole team. On top of this, it is possible to improve KM project results by additional managerial incentives, especially in big and critical KM projects.

The job of the leader of the KM project is to transmit the importance of KM to the employees and controls the change effort. In short, leaders should establish the necessary conditions for effective KM. The necessary conditions include the distribution of team members across various departments. Stakeholders from all sectors should be involved at an early stage. In a project led by IT, there is a danger that the focus will be on the software solution. Therefore, the recommendation is to leave the project to one of the

specialist departments in the company. A flat hierarchy has a positive impact on km projects. In addition, larger companies should think about a director, the Chief Knowledge Officer (CKO). Or to set at least one fixed overall project manager for KMin smaller environments.

One very important part is that KM projects should be planned very well. This includes that the leadership is not only fully behind this concept but also contributes in the long term to the KM thoughts. This thought is best anchored in the company strategy and communicated accordingly. The leadership and the project leaders should publicly commit to it.

Knowledge Resources

It is important for leaders of organisations to understand who has the knowledge, and develop support systems for its creation and application. Then, they can create knowledge maps that identify where knowledge resides and which knowledge needs to be shared with whom, how, and why (intellectual capital). Should knowledge about KM not already exist in the company or not in sufficient quality, there are also external knowledge resources (consultant companies) that can support the entry into the KM process. Of course, any kind of knowledge can be added to the company with external resources so therefore one can say that financial resources are also knowledge resources. It is important here that the external knowledge is handed over to internal knowledge (employees) and that the scope of KM projects is in balance with all the available resources such as human- and also financial-resources.

Knowledge Processes

Another area of concern is how to ensure the quality of content and that the most appropriate knowledge is accessible when needed. Thus, it is recommended that organisations adopt a process-based view to KM. To ensure this good coordination of the KM process is crucial. Build the knowledge process on the whole organisation and not only on technology. Informal face-to-face networking can be used to overcome the limits of IT, in terms of their ability to act as a medium for the exchange of valuable tacit knowledge. In some cases it can also be helpful to create artefacts of ideas to externalise the knowledge to others.

Information Technology

IT is able to work in both directions. Against and with the knowledge process. Careful attention is needed to the potential impact of KMS networks for innovation in relation to existing communities within organisations. So on the one hand, the use of KM systems can cause employees to exchange less face-to-face, making the conversion of tacit knowledge more difficult. On the other hand, KM systems can build bridges between different locations and between employees who work from home when the IT systems are media-rich enough to encourage knowledge sharing. The IT solution for KM should have a knowledge-oriented focus to provide the best accessibility of explicit knowledge. In most cases, not one but a variety of IT tools is the best solution for KM projects. This does not mean that there should be many different knowledge pools but it does mean that it will be hard to find one software solution which provides best solutions for knowledge creation, storage/retrieval and application. The selection of the software should also take support and further development into consideration. In addition, as a very good solution usually does not exist, a good solution with an easy usage should be preferred over a very good one with more

difficult usage. Important factors that need to be considered besides ease of use in the development or a selection of a KMS include also the simplicity of technology, suitability to users' needs relevancy of knowledge content, and standardisation of a knowledge structure.

Environmental Factors

Environmental factors which can be summarized under the terms GEPSE can only rarely influenced by the company itself. Therefore, a company can only try to handle the given conditions as well as possible or even better than other companies. KM systems can contribute to the company's success so that environmental factors no longer influence the company so much. Competition is one environmental factor that makes KM increasingly attractive to companies. In some industries and / or environments competition between companies makes it difficult to retain employees in the long term. One advantage of KM is accordingly that knowledge does not necessarily leave the company with the respective employee if the knowledge or a part of it is recorded in some kind of KMS. Another reason is that good KM may result in competitive advantages over other companies. Competitive advantages can contribute to a more attractive workplace and thus increase the time spent in the company of individual employees. Another environmental factor that also effects the perception of the importance of KM in companies is the globalisation. Globalisation not only effects the competition it also makes the most things more variable and complex. KM can cushion some of the new challenges posed by globalisation.

Measurements

In addition to the above factors, the author also found frequent references to measurements. Many authors named measurements as an important component for the ongoing success of KM projects but could not name definable scales for measurement. This could be a reason why measurements despite its relevance do not appear in any found framework. Measurements for KM that go beyond measuring activities in KM systems do not seem to have been sufficiently researched or at least published yet. Nevertheless, it is close to that without continuous measurements a progress and success of KM activities are difficult to represent. However, this depiction of progress and success is an important part in companies to get resources for projects. Therefore, when planning a KM project, additional research about measurements should be made.

5.3   Research Objectives and Questions

This Bachelor Thesis was aligned along the research objectives and it''s corresponding research questions which were set up in advance in Chapter 1.2. After finishing this thesis the author is now able to answer this questions. The answers given here give only a brief overview of the more detailed results described in the individual chapters.

- RO1: Identify and describe KM frameworks.

    - RQ1a: Which KM frameworks can be identified in literature?

    - RQ1b: Which steps/dimensions/categories are mentioned?

- RO2: Select a KM framework which covers most of the relevant factors and which is suitable for structuring the challenges / best practices.

  – RQ2: Which framework is suitable for structuring the challenges / best practice?

There is a lot of research about KM frameworks in literature. The author of this thesis was only able to examine a few and presented a choice of five different frameworks (see Chapter 3). Each with a different set of dimensions being considered. Each with a different naming set. Wiig's (1995) "Knowledge Management Foundation" for example means the same as Andersen and The American Productivity and Quality Center's (1996) "KM Process" which is called "Knowledge Process" by Okunoye and Bertaux (2008). So the answer to the question of dimensions also depends on the naming scheme used. Since the author has decided to use the framework and naming scheme of Okunoye and Bertaux (2008), here are the dimensions used by them: Organisation Variables, Knowledge Resources, Knowledge Processes, Information Technology and Environmental Factors. The framework of Okunoye and Bertaux (2008) was selected because this framework builds on the different results of the previous frameworks and links different properties of the others together. Not only does it consider most dimensions, it also looks at KM in a holistic way in the corporate context. This made it the best choice for structuring the challenges and best practices in this thesis.

- RO3: Identify KM challenges companies have in effectively and efficiently using KMS and group them based on RO2.

  – RQ3a: Which KM challenges can be discovered in literature and how can these challenges be categorised along the chosen KM framework?

  – RQ3b: What KM requirements can be derived from RO1-RO3 that companies need to consider?

- RO4: Based on RO3, develop a guideline with recommendations which addresses the challenges companies may have in using KM and KMS.

  – RQ4a: Which best practices may help to master the challenges identified in RO3?

  – RQ4b: Which recommendations can be formulated for the individual challenges?

These questions were answered in detail in Chapter 4 "Aspects of Knowledge Management" and Chapter 5 "Best practice Guideline". In principle, the finding is that the challenges to master to successfully operate KM in a company are far-reaching. In this research, most of the information was found about the "organisation variables" section. This is not surprising because companies have the most influence in this area. Everything is possible, from the corporate culture to the information flow in the company, employee training, reward systems and the entire corporate strategy. In reverse, however, this means that the company also has the most challenges here. The promotion of a "sharing culture" is one of the most

mentioned best practices. This is where the greatest successes can be achieved and such culture is the basis for many more best practices. Another area is "knowledge resources". One of the main knowledge resources are the employees of a company. This is about knowing where in the company what knowledge is represented and where external knowledge can be helpful. In the area of knowledge processes, one of the main challenges is to anchor these processes correctly in the company. The main recommendation here is to ensure that the KM process is not just mapped in a software but throughout the company. Information technology is another important area. There are many challenges and opportunities here. The possibilities to support KM are almost endless. Here, however, there is also the danger. IT can not only promote the exchange between employees but also lead to reduced face-to-face communication which is an important part to internalise knowledge. In addition, the correct handling of software in the company is important. Just because a company uses software to support the KM process it does not mean that it makes the KM process better. In addition, the selection of software in the KM environment is so great that much value should be placed on the software selection process. Most of the challenges which reside in a company are also influenced by "environmental factors". The somewhat unclear GEPSE factors include also challenges like competition which is additionally reinforced by today's globalisation. The problem with the "environmental factors" is that there is nearly no way to influence this influences. The best practice here is to use the possibilities from other categories to reduce the influence of the "environmental factors".

6   Summary

The aim of this thesis was to develop a guideline that helps companies in effectively and efficiently managing their knowledge assets with KMS by analysing bad and best practices (along KM theories/frameworks). The research questions that accompanied and structured this work was the question of the right framework and the question of challenges and recommendations for the execution of KM in companies and can be read in Chapter 1.2 "Research Method". Being able to understand KM and its requirements for a company requires a better understanding of the term "knowledge" and the processing of "knowledge". In addition, the terms "Knowledge Management" and "Knowledge Management Systems" were introduced. This basis was set in Chapter 2 "Definitions". The Research questions in RO1 (Section 1.2) which focuses on an overview of frameworks were answered in detail in the chapter "Theories and Frameworks" (Chapter 3). Here, various frameworks have been described. RO2 (Section 1.2) asks for differences between frameworks and its main aim is to find a suitable framework to structure this thesis. There are many different frameworks, each with different viewing angles and different focus. All of them contribute to the research in the KM area. Differences were briefly discussed in Section 3.1. Only a few frameworks manage to look at KM in a holistic way. In this thesis, the framework of Okunoye and Bertaux (2008) was chosen in Section 3.2 of the "Theories and Frameworks" Chapter (3). In the next step, literature was searched for successful and less successful KM projects. The found factors that influenced these projects positively as well as negatively were structured on the basis of the dimensions provided by the selected framework. These aspects were briefly discussed in (Chapter 4) and displayed in a table with additional information such as cites and sources (Table 6.2). Subsequently, recommendations were formulated for all the factors found, which were briefly discussed in the "Best practice Guideline" (Chapter 5).

The thesis shows that KM can be positively and negatively influenced in a variety of ways. That to master Knowledge Management (KM) in a company is a big and far-reaching venture and that technology respectively IT is only a part of the big picture. Many KM factors can only be changed over time and with the commitment of employees, supervisors and the management. Certainly the KM projects at least went better if the individual points and plans considered correctly. Important to mention that this "Best practice Guideline" may contain only a part of the factors to be considered. However, the results of this research can already suggest that the advantages of KM may only be realised by companies that do not only relate to technology, but also make the long-term investment to align the cultural, managerial and organisational elements for Knowledge Management (KM). The main outcome of this thesis is the table 6.2 because this table provides the ability to drill down on any of this thesis mentioned aspect. The entry is possible through the different dimensions. The recommendations to the diverse problems are supported by the cited text passages of the individual sources. Additionally the sources allow the reader to get further information directly from the literature source if desired.

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Appendix

Below are the individual attachments.

A1 Influences of the Conduct of KM

Table 6.1: Summary of identified Knowledge Management Influences

Author	Influences of the Conduct of Knowledge Management
Wiig 1995	1. Exploring knowledge and its adequacy (survey and categorize knowledge, analyse knowledge and related activities, elicit, codify and organize knowledge) 2. Assessing value of knowledge (appraise and evaluate knowledge and related activities) 3. Managing knowledge activity (synthesize knowledge related activities; handle, use and control knowledge, leverage, distribute, automate knowledge)
Leonard-Barton 1995	1. Managerial systems (e.g., education, reward, and incentive systems) 2. Values and norms (e.g., system of cast and status, rituals of behaviours, passionate beliefs)
Andersen and The American Productivity and Quality Center 1996	1. Culture 2. Leadership 3. Measurement 4. Technology

A2 Best practice Guideline

The following pages include the main outcome of this thesis. The "Best practice Guideline".

Table 6.2: Best practice Guideline

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Culture	acceptance of KM process and KM systems	Develop or foster a sharing culture which values knowledge and encourages the whole knowledge process from creation to application. A sharing culture also increases the acceptance of KM systems. A sharing culture means also a collaborative culture. Collaboration enriches the knowledge transfer which promotes the sharing culture itself.	p.301: A sharing culture is critical for the success of knowledge management within any organisation. This firm realised that it needed to develop and foster such a sharing culture if its knowledge management endeavours were to succeed. p.308: As is well documented in the literature, organisational culture plays a critical role in the acceptance and adoption of systems, the modification of their use once installed and overall success of the system in the facilitating and conducting of tasks (Robey and Azevedo, 1994; Coombs et al., 1992; Orlikowsky, 1992). p.308: The literature pertaining to knowledge management highlights the importance of a sharing culture in order to support and foster a knowledge management focus (Alavi, 1999; Davenport and Prusak, 1998; Zack, 1999). p.268: In general, a culture supportive of KM is one that highly values knowledge and encourages its creation, sharing and application. The biggest challenge for most KM efforts actually lies in developing such a culture. p.270: One cultural aspect which is crucial for KM is collaboration. Goh (2002) asserted that a collaborative culture is an important condition for knowledge transfer to happen between individuals and groups.	Wickramasinghe (2003) Wong (2005)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Culture	People are not willing to share their knowledge	Building a relationship of trust between individuals and groups will help to facilitate a more proactive and open knowledge sharing process.	p.270: Trust is also another fundamental aspect of a knowledge friendly culture(Stonehouse and Pemberton, 1999; DeTienne and Jackson, 2001; Lee and Choi, 2003). p.270: Equally important is the element of openness whereby mistakes are openly shared without the fear of punishment. p.270: Making mistakes should be viewed as an investment process in individuals because it can be a key source of learning. p.395: At the same time, it is a culture of confidence and trust. Confidence and trust are required to encourage knowledge management practices in the organisation. p.396: Building trusting and meaningful relationships within the organisation also supports human resources policies enabling improved organisational knowledge management.	Wong (2005) Kalkan (2008)
Organisation Variables	Culture	Management blocks or at least slow down the KM project	Before starting a KM project it is crucial to have the backing from the highest leaders (Depending on the structure and organisation of the company the boardroom or the CEO or similar). In order to positively influence a project, it must be ensured that the management takes KM into account with each decision.	p.6: Lack of senior management support. As for any major project, support in the boardroom is essential.	Sharp (2003)
Organisation Variables	Information and Decision Process	To much information to handle for the employees	Carefully check which information has relevance for KM and which not.	p.23: If we broadly view learning as the process of internalising and converting information to knowledge, these two perspectives seem to support the view that information is the raw material for knowledge, and that more information does not necessarily lead to enhanced knowledge creation and sharing. p.23: the individuals should also be motivated to convert it to knowledge (i.e., learn and internalise the information).	Alavi and Leidner (1999)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	People	Employees reject KM initiative and/ or do not support the KM process	Employees need to be trained to understand KM requirements and employees must be well informed KM is a key to the company's success.	p.273: In a basic sense, organisational members need to be aware of the needs to manage knowledge and to recognise it as a key resource for the viability of a company. p.273: This issue can be addressed if proper basic training is provided to the employees. Through such training, they will have a better understanding of the concept of KM. p.273: Besides this, employees could be trained and educated in using the KM system and other technological tools for managing knowledge. p.274: Equally important is to equip them with the skills to foster creativity, innovation, and knowledge sharing.	Wong (2005)
Organisation Variables	People	Employees reject KM with reference to management	Encourage the leadership to share and offer information as a role model.	p.268: Leaders are important in acting as role models to exemplify the desired behaviour for KM. They should for example, exhibit a willingness to share and offer their knowledge freely with others in the organisation, to continuously learn, and to search for new knowledge and ideas. p.395: For this reason, management should encourage social interaction and dialogue in the organisation. p.396: Top management has to encourage the human resources professionals to be active in the knowledge-management process and coordinate the relationships between the functions of human resources management and knowledge management.	Wong (2005) Kalkan (2008)
Organisation Variables	People	Default knowledge definition does not suit to company needs	Create your own definition of „knowledge" based on your company requirements before you start a KM Project.	p.394: Not developing a working definition of knowledge is a critical error contributing directly to many errors and failures in the knowledge-management process (Fahey and Prusak, 1998).	Kalkan (2008)
Organisation Variables	People	Acquiring and keeping new employees is difficult	A well-trained human resources (HR) department with good HR development ideas is needed to get and bind the right human resources .	p.396: Attracting and keeping people with abilities, behaviours and competencies that add value to the firm's knowledge stock must be targeted. This requires effective recruitment, selection, training, development and compensation policies.	Kalkan (2008)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Reward Systems	People are not willing to share their knowledge	Reward Systems spread over different aspects such as financial bonuses as well as regular evaluations are a good way to encourage sharing behaviour and sharing culture.	p.308: Thus, we can see that a sharing culture is a necessary but not sufficient condition for the satisfactory adoption of a KMS. p.308: Case 2 appears to have had the most problems with trying to foster and develop a knowledge-sharing culture and one that would support its total knowledge management approach. p.308: Perhaps a more sharing culture will be evidenced after the incentives to encourage sharing behaviour have been well established. p.6: Lack of a motivation/incentive program. Employees need encouragement. p.301: A variety of carrot-and-stick methods such as financial rewards and bonuses, evaluations and guiding principals, were adopted.	Wickramasinghe (2003) Sharp (2003)
Organisation Variables	Reward Systems	Employees hoard knowledge to get as many incentives as possible.	Incentives should put the focus on group performance. In addition, it should be possible that they are influenced by individual employees but only in the team reachable.	p.272: If individuals are not motivated to practise KM, no amount of investment, infrastructure and technological intervention will make it effective. p.272: Giving incentives to employees helps to stimulate and reinforce the positive behaviours and culture needed for effective KM. p.273: In order to build a knowledge-based enterprise, incentive systems should be focused on criteria such as knowledge sharing and contribution, teamwork, creativity and innovative solutions. p.273: In particular, rewarding employees with a focus on group performance will instigate a higher level of knowledge exchange between them. Hauschild et al. (2001) extended this notion by stating that employees will be more inclined to seek and contribute knowledge, if their incentives are based on goals that they can influence, but not achieve on their own. Linking rewards solely to individual performance or outcome which can result in competition will certainly be detrimental to a knowledge sharing culture. The provision of both monetary and non monetary benefits could be incorporated into a reward system that supports KM.	Wong (2005)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Reward Systems	The leaders of the departments are not open to the new KM processes	Managerial incentives are a good way to achieve better KM project results especially in big and critical KM projects.	p.395: Managerial incentives might also be helpful for effectively sharing and dealing with tacit knowledge especially in case of critical knowledge projects. p.395: The organisation must value and encourage knowledge creation and sharing.	Kalkan (2008)
Organisation Variables	Structure	The departments are not able to integrate the KM process into their daily routine	Leaders have to establish the necessary conditions for effective KM.	p.268: Other leadership competencies that would be important include steering the change effort, conveying the importance of KM to employees, maintaining their morale, and creating a culture that promotes knowledge sharing and creation.	Wong (2005)
Organisation Variables	Structure	The KM Project is too focused on IT tools and / or driven by the IT department	Make sure that in a KM project stakeholders of different departments are represented.	p.272: Supply-driven approaches focus on using IT-based tools to build networks for the supply of knowledge and information which will then, somehow miraculously, be applied and used to develop innovative solutions. This assumes that the problems of KM are to do with the flow of knowledge and information across the organisation. The aim is to increase that flow by capturing, codifying and transmitting knowledge using IT-based networks. However, even where knowledge can be codified, stored and broadcast, it does not follow that this knowledge will be used or applied by others. p.273: On the other hand, initiatives that are demand driven tend to be more concerned with the creation and application of knowledge in innovation projects. The motivation and attitudes of multiple stakeholders are seen as crucial and consequently there is a more focal concern with human networking processes which can encourage sharing and use of knowledge which is relevant for innovation. This is not to say that supply driven initiatives ignore these factors but they are seen as peripheral to the problems associated with the technology rather than as core features of KM (Scarbrough et al., 1999).	Swan et al. (1999)
Organisation Variables	Structure	The people who were selected to work on the KM project have no time for it	Select people from different departments and explicitly plan their capacities to work on the KM project.	p.272: Despite the fact that some existing functions within an organisation such as HRM and IT have already been working with knowledge issues, establishing a group of people with specific and formal responsibilities for KM is crucial.	Wong (2005)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Structure	Nobody in the company feels responsible for KM	Depending on the size of the company, a "Chief Knowledge Officer" or at least one "Knowledge Management" project manager should be installed.	p.272: One of the more commonly mentioned roles in the literature is the CKO or equivalent. He/she takes the leading role to coordinate, manage and set the course for KM p.272: While large companies may have the resources to establish a team with multiple layers of roles for KM, SMEs will need to take a smaller scale approach.	Wong (2005)
Organisation Variables	Structure	The previous structures make it difficult to work in overlapping teams	Knowledge Management works best with flat organisation structures. Weak autonomy and high fluctuation are the show stoppers of KM projects.	p.396: Hierarchical-bureaucratic structures, though they generate useful outcomes in some organisational settings and under specific circumstances, are considered to prevent knowledge sharing and utilisation. p.396: These structures are based, to a large extent, on the work of multidisciplinary groups with a high degree of autonomy and acting in environments characterised by fluctuation, creative chaos, requisite variety and redundancy (Nonaka and Takeuchi, 1995). p.396: Balancing the encountering needs and interests of knowledge management and business continuity is an emerging challenge for and a responsibility of top management.	Kalkan (2008)
Organisation Variables	Task	The management has lost interest in the KM initiative	The leadership must be made clear that the support must be on-going and it is not sufficient to be present only in the initial stage.	p.268: support from top management should be ongoing and be delivered in a practical manner. Such support could then be transformed into concerted efforts that would contribute to the success of KM.	Wong (2005)
Organisation Variables	Task	Their is no vision for pursuing KM defined	To avoid rejection of new KM initiatives good preparation and planning is required. Preparation involves training for employees as well as the development of a compelling and shared vision for KM.	p.271: Closely related to the notion of strategy, is the development of a compelling and shared vision for pursuing KM. It is essential that employees support this vision and believe that it will work. In addition, clear objectives, purposes and goals need to be set and understood by everyone involved. p.271: In short, all the above elements need to be carefully developed before a substantial investment is made to initiate a KM effort. p.6: No preparation for a knowledge culture or the incorporation of knowledge processes. Good planning and careful preparation are required for a successful KM solution.	Wong (2005) Sharp (2003)

dimension	aspect	problem	recommendation	quotes	sources
Organisation Variables	Task	The use of the KM system stagnates after the project went live.	It is advisable to involve the „users" of a KM System not only in the design process but also in the consistent maintenance and on-going development.	p.24: Another useful line of research would consider methods of making users active contributors to KMS. The very label of "user" is somewhat inappropriate in the context of KMS, as users are both contributors and beneficiaries of the system. Involving users in design is not sufficient: they must be involved in the consistent maintenance of KMS.	Alavi and Leidner (1999)
Organisation Variables	Task	After the company strategy has changed the KM strategy does not fit anymore.	Integrate your KM plans into your enterprise business strategy.	p.271: One of the means for driving the success of KM is to have a clear and well-planned strategy (Liebowitz, 1999).

p.271: There seems to be common agreement in the literature that it has to be linked or integrated with the enterprise business strategy (Zack, 1999; Cook, 1999; Maier and Remus, 2002). | Wong (2005) |
Organisation Variables	Task	The members of the KM project feel overwhelmed by the amount of tasks	A KM project should be well planned and the project team and the leaders should commit to it.	p.6: No real timetable. Careful planning and establishment of schedules are required.	Sharp (2003)
Knowledge Resources	Intellectual Capital	The knowledge that is really needed is not implemented in the KMS	To know who has knowledge and how the knowledge flows helps to create better KM Systems.	p.21: It is important for leaders of organizations to understand who has knowledge, and develop support systems for its creation and application. Then, they can create knowledge maps that identify where knowledge resides and which knowledge needs to be shared with whom, how, and why, with built-in rewards for knowledge creators and brokers.	Gupta et al. (2000)
Knowledge Resources	Intellectual Capital	The employees do not really know how to handle the KM project.	To manage knowledge there is a need to have deep knowledge about Knowledge Management. If your company is new to this field consulting expertise from outside can provide the needed knowledge.	p.309: This firm has two clear and distinct sections for knowledge management within its organisation, an internal section, which is involved with managing its own knowledge, and an external component, which is involved with providing consulting expertise to its clients regarding knowledge management.	Wickramasinghe (2003)
Knowledge Resources	Intellectual Capital	The employees in the KM project do not know how to change the corporate culture.	External consultants may deliver essential knowledge about changing the organisations culture.	p.6: Poor internal communication. Outside consultants may be required to change the corporate culture.	Sharp (2003)

dimension	aspect	problem	recommendation	quotes	sources
Knowledge Resources	Organisational Capital	The expectations for the KM project are very high but it can not cost anything.	The scope of a KM Project has to be in balance with the available resources such as financial and human resources.	p.6: Project scope too large for available resources. Budgeting of finances and other resources is important. p.273: Successful KM implementation is dependent upon resources. Financial support is inevitably required if an investment in a technological system is to be made. p.273: Human resources are needed to coordinate and manage the implementation process as well as to take up knowledge-related roles. p.273: Time is also a consideration; organisations have to free up time for their employees to perform KM activities such as knowledge sharing. p.273: For example, the programme scope must not be too substantial for their available resources. p.273: In addition, proper budgeting of resources is crucial for KM. Arguably, one of the key issues for SMEs in achieving effective KM is to deal with their resources. p.273: This implies understanding how they can be better acquired, allocated and managed for its success.	Sharp (2003) Wong (2005)

dimension	aspect	problem	recommendation	quotes	sources
Knowledge Processes	Knowledge Application	Relevant data is missing in the system. Many items are incomprehensible or contradictory	To ensure the content quality and the accessibility good coordination of the KM process is recommended.	p.308 Another area of concern that is prevalent is how to ensure quality of content, and that the most appropriate relevant information is always accessed. p.272: A KM process refers to something that can be done with knowledge in the organisation (Johannsen, 2000). p.272: creation, storage/retrieval, transfer and application. The execution of KM processes lies at the heart of creating a successful knowledge-based enterprise. Thus, it is important that organisations adopt a process-based view to KM. p.272: Coordination of the KM processes to be performed is also crucial (Holsapple and Joshi, 2000). In addition, they can be incorporated into employees' daily work activities so that they become common practices in an organisation.	Wickramasinghe (2003) Wong (2005)
Knowledge Processes	Knowledge Transfer	Despite a completely implemented knowledge process in the KM system, knowledge is not exchanged between employees.	Build the knowledge process on the whole organisation and not only on technology	p.271: The approach in Ebank was essentially to codify existing knowledge into explicit forms and share this widely via the use of IT tools. This emphasis is also clearly reflected in the literature on KM. However, it is argued that it is tacit rather than explicit knowledge which will typically be of more value to innovation processes (Grant, 1996; Hall, 1993). p.271: In contrast, in Brightco, informal face-to-face networking was often used heavily precisely because the limits of IT networks, in terms of their ability to act as a medium for the exchange of valuable tacit knowledge, were recognised. p.272: They demonstrate that building the physical, infrastructural networks without encouraging active, personal networking can have a negative rather than a positive impact on interactive innovation processes. p.272: Sharing and creating knowledge across heterogeneous organisational and social communities requires an investment in interpersonal interrelationship building, so that those involved can make sense of and envisage the broader goals of the system, which they are designing and developing.	Swan et al. (1999)

dimension	aspect	problem	recommendation	quotes	sources
Knowledge Processes	Knowledge Transfer	Sometimes employees can not articulate their thoughts to others properly.	In some cases it could be helpful to create an artefact to externalise the knowledge to others.	p.3: External representation. An important aspect of design is the creation of artefacts that externalise knowledge. p.3: We have found that using external representations exposes, and focuses discussion on, relevant aspects of the framing and understanding of the problem being studied, such as tacit attitudes, values, and perspective.	Fischer and Otswald (2001)
Information Technology	Process Support	Especially employees who use a home office or miss working in field offices can not sufficiently participate in idea-finding processes and discussions	Develop Systems that are media-rich enough to encourage knowledge sharing	p.273: However, although intense face-to-face networking was a crucial media for knowledge sharing, it could also be seen that this was extremely challenging for those involved. Working away from home, for example, for two weeks in three over a period of over a year, was generating significant stress. p.273: The challenge for IT developers, then, is not to develop systems that aim to replace people as the primary source of expertise. Rather, the aim should perhaps be to develop systems that allow experts to engage in active networking through creating environments that are media-rich enough to encourage knowledge sharing and organisational learning where it is relevant for innovation (Huber, 1991).	Swan et al. (1999)
Information Technology	Process Support	Since the introduction of forums and chats, many topics are no longer discussed within a team but often only between a few individuals.	Careful attention is needed to the potential impact of IT networks on KM for innovation in relation to existing communities within organisations.	p.275: In some cases (e.g. Brightco) communication technologies complement these processes by increasing the ability to communicate across boundaries of time and space. In other cases IT networks may actually undermine knowledge sharing and creation (e.g. in the case of Ebank) by reducing opportunities for informal contact or strengthening, electronically, the existing organisational walls, based on functional or geographical differentiation. Thus careful attention is needed to the potential impact of IT networks on KM for innovation in relation to existing communities within organizations. p.274: Therefore a crucial feature raised by these cases is the importance of social co-ordination and networking (formal and informal) in KM initiatives that encourage active networking are key to interactive innovation processes and an over-emphasis on building IT-based network links may ironically undermine rather than increase this.	Swan et al. (1999)

dimension	aspect	problem	recommendation	quotes	sources
Information Technology	Process Support	There are many software solutions such as Chat systems that also allow the storage or transfer of documents. Documents are often not found when needed, even though they have been shared in an IT system.	The IT solution for KM should have a knowledge-oriented focus to provide the best accessibility of explicit knowledge.	p.395: Accessibility of explicit knowledge resources for employees must be provided by the help of IT. An organisation having a poor IT implementation will be disadvantaged in the global marketplace. Besides, processing data and information, IT implementation and advancement must have a knowledge-oriented focus.	Kalkan (2008)
Information Technology	Product Selection	There is no software solution that meets all our requirements	In most cases, not one but a variety of IT tools is the best solution for KM projects. It is ok to have different applications for different purposes as chat or file storage as long they are all searchable ideally within one integrated company search	p.22: An integrated and integrative technology architecture is a key driver for KMS. No single dominant technology tool or product for KMS emerged in our survey. p.22: KMS seem to require a variety of technological tools in three areas: database and database management, communication and messaging, and browsing and retrieval.	Alavi and Leidner (1999)
Information Technology	Product Selection	Adjustments to the software solution used are very expensive or not possible at all	The software selection should also include support and further development of the software.	p.6: Challenging software with poor vendor support. Improving evaluation processes for vendor products can fix this problem.	Sharp (2003)
Information Technology	Product Selection	The used software solution fulfills all requirements but the operation is very complex	The focus of the KM project should also be reflected in the specialisation of the software. In most cases, an 80 percent solution that is easy to use should be preferred over a 99 percent solution that is harder to use.	p.270: According to Luan and Serban (2002) they can be grouped into one or more of the following categories: business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, search, and e-learning. p.270: Important factors that need to be considered in the development of a KM system include simplicity of technology, ease of use, suitability to users' needs relevancy of knowledge content, and standardisation of a knowledge structure or ontology.	Wong (2005)

dimension	aspect	problem	recommendation	quotes	sources
Environmental Factors	Competition	Low retention of stuff	Low retention of stuff is a major problem. If there is to much competition on the market to hold the stuff longer a good knowledge management is even more important.	p.304: Another challenge at this time was connected to the recruitment and retention of staff. All the consulting companies experienced low staff retention. Hence, there was a strong need to integrate the firms' practices and preserve the knowledge that was lost when consultants left the firm.	Wickramasinghe (2003)
Environmental Factors	Competition	Competition in the sales market makes the situation more difficult.	In order to have a competitive advantage, KM is becoming more and more important.	p.304: It appears that the launch into knowledge management has been a strategic necessity. Clearly, without knowledge management these firms would not be enjoying the current market structure and positions they have today. p.304: Knowledge management continues to be an integral component of these firms' strategies.	Wickramasinghe (2003)
Environmental Factors	Competition	Frequent market changes require processes that are adapted to the daily routine almost every day.	In general, KM processes should be kept as flexible as possible to account for market changes. However, continuous integration of the KM process into the company's main processes is extremely important.	p.397: Coping with increased competition is one of the most significant challenges of knowledge management faced by global business today. Intense worldwide competition forces the firms to take new actions responding to environmental demands, pressures, and challenges almost day to day. p.397: Therefore, a tension between the nature of knowledge management and accelerating pace of change occurs. No practical and worldwide applicable solution can be proposed in response to this problem. In general, specific knowledge management programs should be designed as flexible as possible. But the framework and main principles of knowledge management initiative must be structured as a steady construction in order to internalise knowledge management as an essential process in the organisation.	Kalkan (2008)
Environmental Factors	Globalisation	Globalisation makes competition harder and corporate structures more complex	KM can cushion some of the new challenges posed by globalisation.	p.304: In fact, the global focus that had developed for all these firms, making the respective organisations not only much larger, but also more complex, was a key driver for pushing these companies into knowledge management.	Wickramasinghe (2003)

dimension	aspect	problem	recommendation	quotes	sources
	Measurement	During a KM project it is difficult to measure success. Before a KM project, it is difficult to attract stakeholders to finance such a project.	Measuring metrics can help with a variety of problems. On the one hand, it helps to better control the progress and success of KM. On the other hand, it is needed to show the stakeholders the value and importance of KM. It can also help to get the financial support for a KM project. Although the importance of measurements is very clear, it is difficult to find reliable figures in the KM area.	p.271: An initiative like KM will suffer the risk of becoming just another management fad, if it is left unmeasured. p.271: Measurement enables organisations to track the progress of KM and to determine its benefits and effectiveness. p.271: Measurement is also needed to demonstrate the value and worthiness of a KM initiative to management and stakeholders. p.271: Another key aspect of measurement is to evaluate the impact that KM has on bottom line financial results. p.271: Nevertheless, there is still no absolute method for measuring KM in an organisation (Gupta et al., 2000), and this is an area which is still being explored by academics and practitioners (de Gooijer, 2000). p.309: Measuring the effectiveness and contribution of knowledge management is a key concern for all these organizations. p.21: There is a need to develop accounting procedures for valuing intangible assets of organisation as well as incorporating models of intellectual capital that in some way quantify the speed of innovation and the development of core competencies.	Wong (2005) Wickramasinghe (2003) Gupta et al. (2000)